Conclusion: Echocardiography is underutilised in acute PE in some regional hospitals in Australia. Elevated troponin levels are associated with increased short term morbidity in acute PE. There is a high proportion of accompanying DVT with acute PE.

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Assessment of Optimal Cell Therapy for the Angiogenesis Response in a Murine Hindlimb Ischaemia Model using CD34$^+$ cells and Endothelial Progenitor Cells

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Purpose: Therapeutic angiogenesis using stem/progenitor cells has been the focus of recent research. CD34$^+$ cells and endothelial progenitor cells (EPCs) have been found to promote angiogenesis. This study aimed to assess the angiogenic potential of CD34$^+$ cells and EPCs using different modes of delivery *in vivo*.

Methods: Human EPCs were isolated from cell cultures and CD34$^+$ cells were purified from buffy coat using microbeads. Unilateral hindlimb ischaemia was introduced on BalbC nu/nu mice. At 24 hours post-surgery 2×10^5 CD34$^+$ cells, EPCs, or PBS control were injected intravascularly (IV) to the tail vein, or intramuscularly (IM) into adductor muscle. Laser Doppler perfusion imaging (LDPI) was used to assess flow recovery. Adductor muscle was assessed for capillary density.

Results: By day 10 post-surgery mice injected IM showed better recovery in LDPI, compared with those mice injected IV (LDPI 0.30 ± 0.06 *vs.* 0.15 ± 0.05; $P < 0.05$). This was true for CD34$^+$ cells, EPCs and PBS. Mice receiving CD34$^+$ cells IM recovered better from day 10 to 21 when compared to mice injected IM with EPC or PBS (day 21 LDPI 0.45 ± 0.04, 0.35 ± 0.05 and 0.28 ± 0.05, respectively: $P < 0.05$). Immunohistochemical staining of adductor muscles revealed capillary density was highest in mice receiving CD34$^+$ cells IM, compared with those mice receiving EPC IM, PBS IM, CD34$^+$ IV, EPC IV, and PBS IV ($155 \pm 9\%$, $140 \pm 5\%$, $135 \pm 7\%$, $115 \pm 10\%$, $110 \pm 10\%$ *vs.* 100% for PBS IV, respectively; $P < 0.05$).

Conclusions: This study provides evidence that direct IM injection of CD34$^+$ cells into the ischaemic hindlimb delivers the best angiogenesis outcome among various cell therapy techniques investigated in this study.

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Association of Left Ventricular Motion and Central Blood Pressure Waveform Morphology

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Background: Central blood pressure is a determinant of cardiovascular outcome however it can be described by parameters other than systolic and diastolic pressure with central augmentation index (AIx) often utilised. Although generally considered as determined by peripheral pressure wave reflection the not all data are consistent with this interpretation of AIx. We hypothesised that the velocity of the base of the heart during systole may influence central pressure waveform morphology, including the augmentation index.

Methods: We studied the carotid pressure waveform, aortic stiffness and endothelial function in 20 healthy young males (full data available in 19). Arterial stiffness was measured by carotid-femoral pulse wave velocity (cPWV), endothelial function by Peripheral Arterial Tonometry and central BP waveform by carotid applanation tonometry. Basal cardiac motion was assessed with pulsed wave tissue Doppler imaging of the anterior mitral annulus.

Results: Carotid AIx decreased after the administration of GTN by $11.3 \pm$ (sem)4.6% ($P = 0.02$) however time to the inflection point (Ti) did not change. During systolic contraction at both baseline and after GTN the time to peak annular systolic velocity was directly related to, and always preceded, carotid Ti ($R^2 = 0.81$; $p < 0.01$). Carotid Ti and AIx were not related to cPWV or endothelial function.

Conclusion: Rather than only being a consequence of arterial properties Ti, and therefore central AIx, may be substantially determined by left ventricular function. These findings question the interpretation of central AIx as a measure of pressure wave reflection and aortic stiffness and therefore impact on its interpretation in diagnosis and treatment of cardiovascular risk.

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Augmentation Index (AIx) and Augmentation Pressure (AP) in a Cardiac Population

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Background: Arterial stiffness and pressure wave reflection are associated with cardiovascular risk. The AIx is

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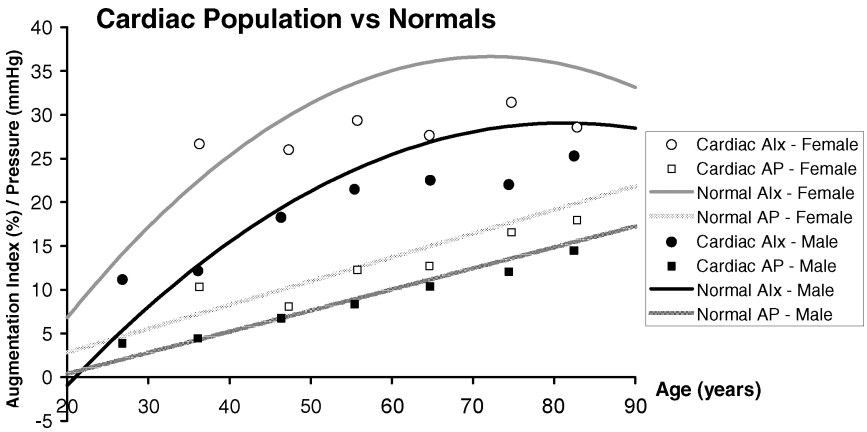
the proportion of central aortic pulse pressure that is attributed to the reflected pulse wave. We hypothesise that in a cohort of patients, who have one or more cardiac risk factors, and suspected coronary artery disease; arterial stiffness will be elevated compared to a normal population.

Methods and results: 910 patients presenting for coronary angiography at Westmead Hospital, Sydney, were recruited into the Australian Heart Eye Study (AHES). Brachial blood pressure was recorded (HEM 907, Omron). Radial artery waveforms were measured with a tonometer and pulse wave analysis was used to derive central blood pressures, AP and AIx (SphygmoCor, AtCor Medical). The average values for each decile of age were compared against normal reference ranges derived from 4001 healthy, normotensive individuals (McEniery et al., JACC 2005). The figure shows that while AP is consistent with normal ranges, the AIx is lower than that that of normals, for both genders.



Conclusions: AIx and AP are not significantly increased in a cardiac population, contrary to expectations.

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This abstract has been withdrawn.

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Calibration of Carotid Central Pressures: A Flaw in Brachial Applanation Tonometry?

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Central pressure, based on carotid and brachial applanation tonometry (AT) does not predict outcomes. This may be due to inaccuracy of brachial and carotid AT. No validation has been published.

To test its (in)accuracy, we measured radial, brachial and carotid pressure pulse waveforms by AT in 100 subjects. Carotid systolic (SP) and pulse (PP) pressures were estimated by two techniques. First, the Pressure Equivalence (PE) technique calibrated brachial waves with brachial cuff pressure values, then the carotid wave was calibrated by assuming identical mean and diastolic pressures, with carotid SP extrapolated. Second, SphygmoCor® technique applied the Transfer Function (TF) to the radial waveform, calibrated to brachial cuff, to generate carotid SP and PP.

Amplification was significant between carotid and brachial (8.0 mm Hg, $p < 0.0001$) with TF, but not with PE (1.5 mm Hg, p = NS). PE gave considerable amplification between brachial to radial (8.4 mm Hg), which was not present with the TF. Form Factors (FF = (mean pressure − diastolic pressure)/PP) for carotid and brachial waves were similar (40.2 c.f. 39.1%; p = NS), but different to the radial (34.5%; $p < .0001$). Amplification as brachial PP ÷ carotid PP using PE was insignificant, but with TF was positive (18%, $p < 0.0001$).

The PE method for recording PP amplification in the upper limb is inaccurate. A major problem is use of AT in carotid and brachial arteries, which cannot reliably be applanated. Findings explain inability of the PE method to predict cardiovascular outcomes, and superiority of TF. "Die Methode ist Alles" (Carl Ludwig 1852).

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Correlation Between Radial Artery- and Peripheral Arterial Tonometry Derived Augmentation Index in Patients with Atrial Fibrillation

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Introduction: Augmentation index (AI) measures the contribution that wave reflection makes to the arterial pressure waveform. AI is considered a surrogate marker for the stiffness of the arterial system; however its utility in atrial fibrillation (AF) is unknown. The AI is routinely recorded from the radial artery (rAI). AI can also be calcu-